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TOPIC REVIEW

Magnetic Hyperthermia as an adjuvant cancer therapy in combination with radiotherapy versus radiotherapy alone for recurrent/progressive glioblastoma: a systematic review

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Abstract

Introduction Hyperthermia therapy (HT) is a recognized treatment modality, that can sensitize tumors to the effects of radiotherapy (RT) and chemotherapy by heating up tumor cells to 40–45 °C. The advantages of noninvasive inductive magnetic hyperthermia (MH) over RT or chemotherapy in the treatment of recurrent/progressive glioma have been confirmed by several clinical trials. Thus, here we have conducted a systematic review to provide a concise, albeit brief, account of the currently available literature regarding this topic.

Methods Five databases, PubMed/Medline, Embace, Ovid, WOS, and Scopus, were investigated to identify clinical studies comparing overall survival (OS) following RT/chemotherapy versus RT/chemotherapy + MH.

Results Eleven articles were selected for this systematic review, including reports on 227 glioma patients who met the study inclusion criteria. The papers included in this review comprised nine pilot clinical trials, one non-randomized clinical trial, and one retrospective investigation. As the clinical trials suggested, MH improved OS in primary glioblastoma (GBM), however, in the case of recurrent glioblastoma, no significant change in OS was reported. All 11 studies ascertained that no major side effects were observed during MH therapy.

Conclusion Our systematic review indicates that MH therapy as an adjuvant for RT could result in improved survival, compared to the therapeutic outcomes achieved with RT alone in GBM, especially by intratumoral injection of magnetic nanoparticles. However, heterogeneity in the methodology of the most well-known studies, and differences in the study design may significantly limit the extent to which conclusions can be drawn. Thus, further investigations are required to shed more light on the efficacy of MH therapy as an adjuvant treatment modality in GBM.

Keywords Magnetic hyperthermia · Glioma · Clinical Trial · Overall survival · Systematic Review

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